

Translation

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PATENT COOPERATION TREATY

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PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 4161-227PCT	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/CA2003/001050	International filing date (day/month/year) 10 juillet 2003 (10.07.2003)	Priority date (day/month/year) 12 juillet 2002 (12.07.2002)
International Patent Classification (IPC) or national classification and IPC H01M 4/48		
Applicant HYDRO-QUÉBEC et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 7 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of _____ sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 12 février 2004 (12.02.2004)	Date of completion of this report 18 October 2004 (18.10.2004)
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PT/CA2003/001050

I. Basis of the report

1. With regard to the elements of the international application:*

- ☒ the international application as originally filed
- ☒ the description:
 pages 1-18, as originally filed
 pages _____, filed with the demand
 pages _____, filed with the letter of _____
- ☒ the claims:
 pages 1-61, as originally filed
 pages _____, as amended (together with any statement under Article 19
 pages _____, filed with the demand
 pages _____, filed with the letter of _____
- ☒ the drawings:
 pages 1/5-5/5, as originally filed
 pages _____, filed with the demand
 pages _____, filed with the letter of _____
- ☐ the sequence listing part of the description:
 pages _____, as originally filed
 pages _____, filed with the demand
 pages _____, filed with the letter of _____

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language _____ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/fig _____

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rule 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/CA 03/01050

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	13-15, 21, 24, 26, 32-37, 39, 40, 42, 44, 49	YES
	Claims	1-12, 16-20, 22, 23, 25, 27-31, 38, 41, 43, 45-48, 50-61	NO
Inventive step (IS)	Claims		YES
	Claims	1-61	NO
Industrial applicability (IA)	Claims		YES
	Claims	1-61	NO

2. Citations and explanations

1. Reference is made to the following documents cited in the search report. The numbering below will be used throughout the remainder of the procedure:

D1: EP 1 049 182 A

D2: WO 02 27 823 A

D3: WO 02 46 101 A(*)

D4: US 5 521 026 A(*)

(*) cited in the application

2. The present application does not meet the requirements set out in PCT Articles 33(1) to (3), as the subject matter of claims 1-61 does not meet the requirement of novelty defined by PCT Articles 33(1) and (2), nor does it involve an inventive step as defined by PCT Articles 33(1) and (3) (see passages cited in the search report).

3. D1 describes a mixture of particles comprising a non-conducting or semi-conducting nucleus in accordance with the application, and coated with a conducting carbon layer (first carbon source), generally produced by decomposing organic compounds, such as sugar or cellulose acetate ([0019], [0057]),

on the surface of the particles constituting the nucleus. When the electrodes (anodes or cathodes) are being prepared, these coated products are mixed with carbon black (second carbon source) in accordance with operating mode (a) of claim 41 of the present application. The particles of carbon black form chains (Figure 1) that improve conductivity ([0020]). The proportion of carbonaceous products does not exceed 55% and is preferably 15% by weight of the final material. The proportions of the compositions can be found in the examples.

In the light of the passages cited in the search report, the subject matter of at least claims 1-12, 16-20, 22, 23, 25, 38, 41, 43, 45-48 and 50-61 has been explicitly described. These claims lack novelty over D1. Even if the subject matter of the other claims is formally accepted as novel, a more refined selection of the mixture parameters or the method of preparation can be considered inventive only if the product or the method has unexpected effects or unexpected properties in comparison with the rest of the field described in D1. However, no such effect or property of this kind is indicated in the application. The application does not even contain the comparative tests required to show the technical advantage of preparing a hybrid coating containing at least two conducting materials, in particular two types of carbon. Therefore, the subject matter of claims 15, 21, 24-37, 42, 44 and 49 does not involve an inventive step.

4. D2 is a further development of the invention of D1 which corresponds to CA-A-2 270 771 cited in D2. D2

is more specifically concerned with the improvement (modification) of the method for preparing particles coated with carbon produced by thermal decomposition of particles of organic compounds such as cellulose acetate. In one specific example, D2 describes the preparation of particles coated and cross-linked with carbon. In the light of the passages cited in the search report, at least the subject matter of claims 1-5, 20, 22, 23, 25, 38, 41, 43, 45-48 and 50-61 lacks novelty over D2.

The rest of the claims lack inventive step for the same reasons as those given for D1. Furthermore, taking into account the obvious continuity between D1 and D2, a person skilled in the art is able to combine the teaching of D1 and D2 without an inventive step being involved.

5. D3 describes particles coated with carbon obtained from a first source having a core in accordance with claims 5 to 10-16 of the application. The method of preparation is similar to the methods described in D1 and D2. These coated particles are then mixed with carbon black (second source) to form a coating composition in accordance with the teaching of D1.

The first source of carbon is any one of the available sources (page 12, line 26 to page 13, line 14). The second source of carbon is the carbon powder required to prepare the coating composition for forming the electrode. Example 4 illustrates preparation of the electrode, the method involving mixing $\text{Li}_4\text{Ti}_5\text{O}_{12}$ particles coated with a layer of carbon and of a carbon black different from the one which made it possible to produce the original

particle-coated layer. The support is in accordance with claims 55 to 59 of the application. The basic example shows the importance of creating a close homogeneous mix; the mix is produced by co-grinding in a ball mill. Since the coating composition is made and the coating of the electrode is performed as in D1 or the prior art cited in D1, it is reasonable to expect that the structure of the carbon particles added to the carbon-coated particles in the coating solution will enable them to form chains between the coated particles.

In the light of D3, the subject matter of at least claims 1-12, 16-20, 22, 23, 25, 27-31, 41 (mode (a)), 43, 45-47 and 50-61 lack novelty over D3. The rest of the claims do not involve an inventive step for the reasons stated earlier in relation to D1 and D2.

6. D4 is a document which apparently illustrates the prior art as presented in D1. The particle mixture differs from the mixture of the application essentially in that only a single source of carbon particles is used to produce the coating. The mixture is homogenised by mechanical grinding in a ball mill (see, inter alia, examples 1 and 2). While the subject matter of the claims can be recognised as novel, whether it involves an inventive step over the teaching of D4 remains to be established.
7. It is not currently possible to know which part of the application could form the basis of a new claim capable of meeting the requirements of novelty and inventive step according to PCT Article 33.

8. The current claims do not meet the requirements of clarity and conciseness of PCT Article 6 and PCT Rule 6.
- 8a. In the light of the definitions "conductive hybrid coating" and "conductive hybrid chains" (page 4 of the description), claims 1 to 3 define the same object in different terms. These claims should be reduced to one.
- 8b. Claims 13, 25 and 38 contain relative terms without precise meaning. These claims should be eliminated or supplemented with precise physical values. The features of these claims do not contribute any element which distinguishes them from the cited prior art.
- 8c. There is a discrepancy between the content of claim 37 and page 9, lines 5-10.
- 8d. The dependence of the claims should be amended.
(a) Claim 12 should be dependent on claim 10,
(b) Claim 17 cannot be dependent on claims 13 and 14, and claims 16 and 17 should follow claims 11 and/or 12,
(c) claim 49 cannot be dependent on claim 44.
- 8e. If the product were novel over D1 or D2 or D3, the method according to claim 41 would be considered to be defined by the result to be achieved (the product of the previous claims), as it would a priori lack essential features (the method parameters) that make it possible to produce the desired product.

8f. If the product can be defined as such, a definition of a method of preparation by which it can be produced is superfluous and unnecessary. The reference in claims 50 and 51 to said method should be deleted.

8g. As regards the terminology and the description in general (claims 20 to 34, and Figure 3), it is not clear whether:

- the hybrid chains are part of the coating, and whether
- carbon 2 is part of the coating, or constitutes only the chains binding the coated particles.